

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

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UNITED STATES OF AMERICA

14-CR-414 (BMC)

-against-

RASHAWN JERMAINE SMALLS
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DECLARATION OF DR. DAN KRANE

I, DAN KRANE, pursuant to 28 U.S.C. § 1746, declare as follows:

BACKGROUND

1. My background and qualifications are set forth in a declaration that was submitted to the Court on May 15, 2015 (the “May 15 Declaration”).
2. In the May 15 Declaration, I raised a number of concerns about the FST, including my concerns with the conclusion reached by OCME Criminalist Melissa Huyck that the evidence sample for the “entire grip” area of the gun was a three-person mixture.
3. Specifically, I noted that OCME’s practice of disregarding the locus with the highest number of alleles when estimating the total number of contributors significantly increases the possibility of mischaracterizing four-person mixtures as three-person mixtures. I supported my observations with empirical evidence demonstrating that, when following OCME’s practice of disregarding the locus with the largest number of observed alleles, as was done in this case, nearly all known four-person mixtures would be incorrectly characterized as three-person mixtures.
4. I thus concluded that the grip area sample may have been derived from four or more contributors.

5. Because the FST has not been validated for use on four-person mixtures, I further concluded that OCME's use of the FST in this case was inappropriate and that the LR generated with it is unreliable.
6. I have reviewed the Affidavit of Dr. Craig O'Connor dated June 5, 2015 (the "June 5 O'Connor Aff."), responding to my criticisms of OCME's approach to estimating the number of contributors in this case. Dr. O'Connor's affidavit does not adequately address my concerns or the data I supplied supporting them. Instead, it raises additional concerns.
7. My responses to Dr. O'Connor's affidavit follow below.
8. In paragraph 11 of his affidavit, Dr. O'Connor sets forth a table showing nine characteristics that tend to distinguish three-person from two-person mixtures, and eight characteristics that tend to distinguish four-person from three-person mixtures. June 5 O'Connor Aff. ¶ 11 and Table 2. Dr. O'Connor did not develop the table himself. It is drawn from an OCME validation study in which he did not participate. See Jahelda Perez, *et al.*, *Estimating the number of contributors to two-, three-, and four-person mixtures containing DNA in high template and low template amounts*, Croat. Med. J. 52, 314-26, 314 (2011) (the "Perez Study").
9. Referring to the table, Dr. O'Connor notes that six of the nine characteristics associated with three-person mixtures and only three of the eight characteristics associated with four-person mixtures are present in the sample from the grip area of the gun. *Id.* at ¶ 15. In part because the sample includes more characteristics associated with three- than with four-person mixtures, he concludes "it is more cautious to classify this mixture as containing at least three contributors rather than at least four contributors." *Id.* at ¶ 16. Dr. O'Connor does not say the sample is *not* a mixture of at least four individuals.

10. Table 2 fails to account for critical factors, such as mixture ratios and quantities of template DNA, that should play an important role in determining the minimum (or the even the most likely) number of contributors to a mixed sample. Further, the list of criteria provided in Table 2 is not weighted, meaning that the table fails to identify which characteristics are more or less helpful in determining the minimum (or even the most likely) number of contributors to a mixed sample.
11. Dr. O'Connor's unweighted list of criteria has no independent value. Nor does the Forensic DNA community have a proven methodology for assigning weight to the factors. Absent such a methodology, Dr. O'Connor's observation that the sample from the grip area contains six characteristics of a three-person sample and just three characteristics of a four-person sample is scientifically meaningless. I presume that this explains why Dr. O'Connor stops short of assigning a numerical probability to the relative likelihood that the evidence sample is a mixture of at least three contributors rather than a mixture of at least four contributors.
12. As I demonstrated in the May 15 Declaration, the presence of seven alleles at even one locus is significant and should be weighted heavily in favor of a finding that the evidence sample in this case may be a mixture of at least four individuals. I am not alone in my thinking. Indeed, most scientists would agree that consideration of the locus with the maximum number of alleles is the primary factor in assessing the minimum number of contributors to a mixture. For many DNA testing laboratories, it is effectively the only factor that is considered in practice. *See e.g., John Buckleton, et al., Towards understanding the effect of uncertainty in the number of contributors to DNA stains, Forensic Sci. Int'l: Genetics 1, 20-28 (2007).* In OCME's own protocols, for example, the first indicator considered is the maximum number of alleles. *See, NYC Office of Chief Medical Examiner, Forensic Biology*


Protocols for Forensic STR Analysis at 384, available at

<http://www.nyc.gov/html/ocme/downloads/pdf/Fbio/Protocols%20for%20Forensic%20STR%20Analysis.pdf> (“A minimum number of contributors to a mixed profile can be estimated using the locus or loci demonstrating the largest number of labeled peaks.”)

13. The detection of 69 alleles in the evidence sample is another factor that might be given more weight than the other factors listed in Table 2. Dr. O'Connor suggests that it was within the analyst's discretion to characterize the sample as a three-person mixture because three of the 69 alleles could have been stutter artifacts rather than alleles derived from template DNA isolated from the sample. June 5 O'Connor Aff. ¶ 16. Even assuming three of the alleles were stutter, and 66 is the appropriate maximum number of alleles to assign to the sample, Dr. O'Connor's analysis is inconsistent with OCME's validation studies. The authors of the Perez Study concluded that samples with 65 or more alleles are “best described” as four-person mixtures. Perez Study at 318. The Perez Study also recommended that samples with a range of 57-66 alleles be characterized as “3-4” person mixtures, not as “3” person mixtures. Perez Study at 320, Table 5.
14. In sum, Dr. O'Connor's affidavit does not change my opinion that the sample from the grip area of the gun could be a four-person mixture. An individual typically contributes just one or two alleles per locus such that a three-person mixture should not have more than six alleles at any given locus. The grip area sample has seven alleles at one locus. Therefore, the simplest explanation is that it is a mixture of at least four individuals. I disagree with Dr. O'Connor's conclusion that “it is more cautious to classify this mixture as containing at least three contributors rather than at least four contributors.”

15. Moreover, I take issue with Dr. O'Connor's use of the word "cautious." It is not a scientifically recognized term, and its meaning is not clear in this context. Dr. O'Connor may mean that it is "more likely than not" that the evidence sample in this case is derived from three individuals rather than from four or more individuals. However, there is no generally accepted means of determining the relative probability of those two propositions. Certainly, from the defendant's perspective, it would be far more cautious to acknowledge the sample may be a mixture from four or more individuals. It is undisputed that the FST has not been validated or approved for use with four-person mixtures and simply should not be used for samples with alleles from four or more individuals.
16. Dr. O'Connor appears to be more comfortable than I am in disregarding the affirmative indications (i.e. the observation of seven alleles at one locus and 69 total alleles across all tested loci) that the sample is a mixture from at least four contributors. Regardless, we both agree that this is a sample: 1) with DNA from *at least* three individuals; and 2) that the FST should not be used for samples with DNA from four or more individuals. Given that the evidence sample may be, and by some important indicators actually is, a mixture of four or more individuals, it is not suitable for analysis with the FST.

Dated: June 17, 2015
Dayton, Ohio


Dan Krane, Ph.D.